

## Case Report

# Small bowel bleeding treated successfully with transcatheter arterial embolization with imipenem/cilastatin

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**Background:** Small bowel bleeding is an uncommon cause of lower gastrointestinal bleeding, which may require different management.

**Case Presentation:** A 37-year-old man presenting with hematochezia was promptly diagnosed with small bowel bleeding by computed tomography angiography. Transcatheter arterial embolization was carried out because the patient's hemodynamic status deteriorated. Hemostasis was achieved by embolization with imipenem/cilastatin, although superselective embolization failed. Capsule endoscopy revealed multiple ulcers and erosions. Drug-induced small bowel injury was suspected to be the cause of small bowel bleeding.

**Conclusion:** Computed tomography angiography can facilitate the management of lower gastrointestinal bleeding. Considering transcatheter arterial embolization and choosing an optimal embolic agent depending on the situation are important in the management of hemodynamically unstable patients.

**Key words:** Drug-induced small bowel injury, imipenem/cilastatin, lower gastrointestinal bleeding, small bowel bleeding, transcatheter arterial embolization

## INTRODUCTION

HEMATOCHEZIA IS A common presentation among patients visiting the emergency department. In most cases, it is associated with lower gastrointestinal bleeding (LGIB). Lower gastrointestinal bleeding is defined as bleeding originating from a site below the ligament of Treitz. Small bowel bleeding is uncommon in LGIB, and occasionally requires different management from that used in typical cases of LGIB. We encountered a case of small bowel bleeding that was promptly diagnosed and successfully treated.

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Received 26 Nov, 2021; accepted 24 Jan, 2022

### Funding information

No funding information was provided.

## CASE PRESENTATION

A 37-year-old man presented with hematochezia. He had fresh blood in his stool twice over several hours. He had a history of gout and had taken non-steroidal anti-inflammatory drugs (NSAIDs; loxoprofen 60 mg) three times a day occasionally over the past month for the gout-related pain in addition to a proton pump inhibitor (PPI). On physical examination, there was tachycardia of 108 b.p.m. and slightly low blood pressure of 96/59 mmHg. Body temperature was 37.9°C. There were no significant findings, including hemorrhoids. On laboratory examination, both hemoglobin and hematocrit were slightly low at 12.2 g/dL and 34.1%, respectively, while blood urea nitrogen and creatinine levels were within the normal range at 12.7 and 0.92 mg/dL, respectively. Computed tomography angiography (CTA) showed extravasation of the contrast medium into the small bowel (Fig. 1). Deep enteroscopy was planned at this stage. However, tachycardia worsened to 130 b.p.m. and hemoglobin dropped to 8.7 g/dL, although blood pressure remained stable. Therefore, angiography was

performed to achieve immediate hemostasis. Although angiography of the superior mesenteric artery showed extravasation from the jejunal arteries, selective identification of the bleeding source vessels was difficult (Fig. 2). Consequently, embolization was undertaken at a site as close as possible to the bleeding site using a mixture of 0.5 g imipenem/cilastatin (IPM/CS) and 5 mL contrast medium. Subsequently, the extravasation disappeared. Two units of red blood cells were required until the hemodynamic status was entirely stabilized. On day 4, the patient underwent both upper and lower endoscopies and capsule endoscopy to determine the etiology of the bleeding. Although neither upper nor lower endoscopies revealed any significant findings, capsule endoscopy showed multiple erosions and ulcers in the jejunum (Fig. 3), which was considered to be drug-induced small bowel injury. On day 11, he was discharged without any complications, including rebleeding events.

## DISCUSSION

**S**MALL BOWEL BLEEDING is categorized as LGIB; nonetheless, it is a distinct condition with worse outcomes than colorectal and upper gastrointestinal bleeding as undertaking endoscopy for both diagnosis and hemostasis is more challenging. In one study, small bowel bleeding required significantly more investigations for diagnosis and more blood transfusion, along with longer hospital stays and higher mortality rates.<sup>1</sup>

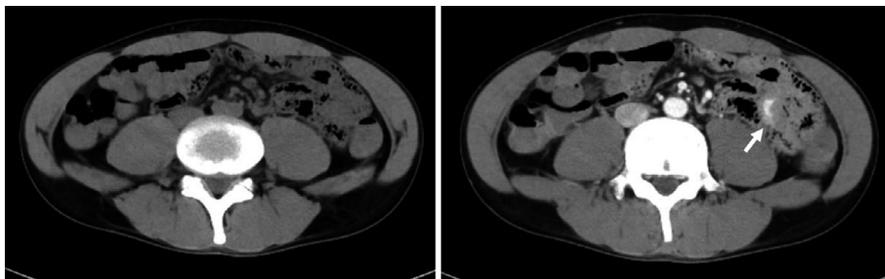
Moreover, small bowel bleeding is less common than other types of gastrointestinal bleeding, and reportedly accounts for only 5–10% of all types of gastrointestinal bleeding.<sup>2</sup> Consequently, small bowel bleeding is often not suspected in patients presenting with hematochezia.

The medication history can be a key for suspected small bowel bleeding because both NSAIDs and PPIs are considered risk factors for small bowel injury. In one study, small

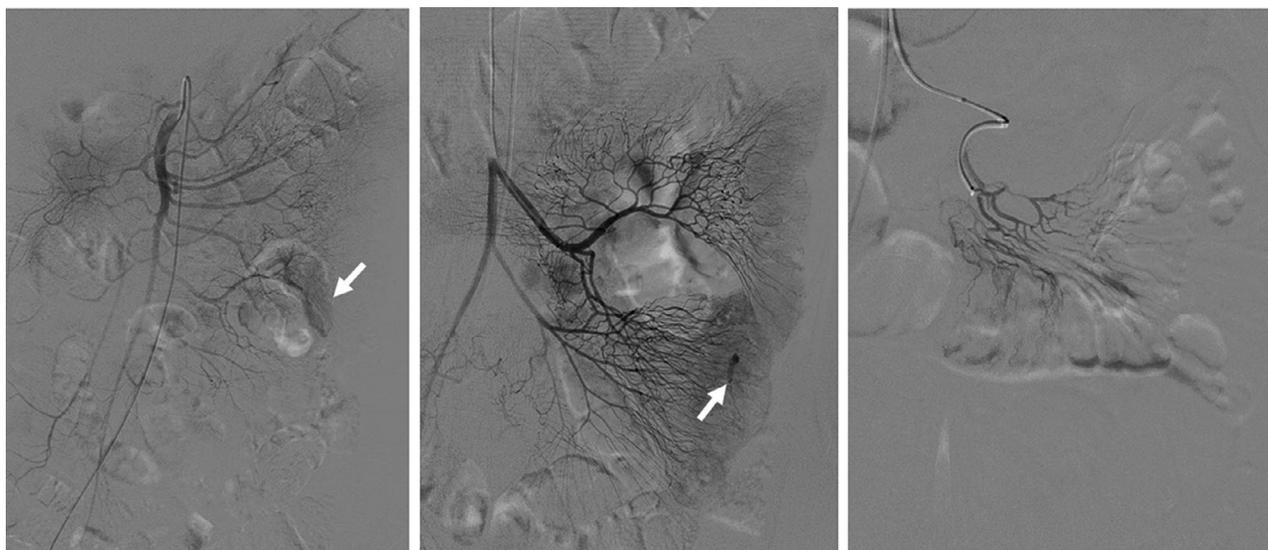
bowel injury was observed in 71% of arthritis patients who took NSAIDs for more than 3 months, as compared to 10% of non-NSAID users.<sup>3</sup> In a randomized controlled trial, the proportion of patients developing small bowel injury in the group taking PPIs and NSAIDs together was significantly higher than that in the control group taking placebo and NSAIDs, at 44.4% and 16.7% ( $P = 0.04$ ), respectively.<sup>4</sup> One possible reason is that PPIs could induce dysbiosis and exacerbate NSAID-induced small bowel injury interfering with the intestinal microbiota.<sup>5</sup>

Computed tomography angiography is usually recommended only in hemodynamically unstable patients with LGIB. Two major guidelines describe the role of CTA in LGIB. According to the American College of Gastroenterology guidelines, CTA should be considered prior to angiography only in those patients who do not respond sufficiently to fluid resuscitation and cannot tolerate colonoscopy, including bowel preparation.<sup>6</sup> If patients respond adequately to fluid resuscitation and become hemodynamically stable, early colonoscopy should be considered. However, the European Society of Gastrointestinal Endoscopy guidelines suggest that if patients are hemodynamically unstable, CTA should be considered first prior to any treatment, regardless of the response to hemodynamic resuscitation.<sup>7</sup>

The indication for CTA is often obscure because the definition of hemodynamic instability varies depending on the clinician. As CTA can facilitate the management of acute LGIB by identifying the bleeding sites while avoiding unnecessary endoscopies, it might be feasible to have a lower threshold for CTA in LGIB, for instance, with ongoing bleeding, dual antiplatelet therapy, coagulopathy, and/or borderline vital signs. According to a systematic review undertaken in 2017, no randomized controlled trials have compared early colonoscopy to CTA in LGIB.<sup>8</sup> However, in one retrospective study, the detection rate for bleeding sites was higher in the CTA with colonoscopy group than in the



**Fig. 1.** Abdominal computed tomography without contrast in a 37-year-old man with small bowel bleeding did not show any significant findings (left panel), whereas computed tomography angiography showed extravasation in the small bowel wall (right panel, arrow).



**Fig. 2.** Angiography in a 37-year-old man with small bowel bleeding showing extravasation from the superior mesenteric artery and jejunal artery (arrows). After embolization with imipenem/cilastatin, the extravasation disappeared. Left panel, from the superior mesenteric artery; middle panel, from the jejunal artery; right panel, from the jejunal artery after embolization.



**Fig. 3.** Capsule endoscopy in a 37-year-old man with small bowel bleeding showing multiple erosions and ulcers in the jejunum.

colonoscopy alone group (35.7% versus 20.6%;  $P < 0.01$ ), suggesting that CTA with colonoscopy might enhance the identification of bleeding lesions.<sup>9</sup>

Transcatheter arterial embolization (TAE) is recommended as the first-line treatment for active bleeding,

especially in hemodynamically unstable patients.<sup>2</sup> Although TAE is a well-established treatment with improved outcomes and few complications, it is still challenging to maintain a balance between preventing rebleeding and bowel infarction. Careful techniques, including choosing an optimal embolic agent, are essential to avoid such complications. The choice of the embolic agent, such as absorbable gelatin sponges, N-butyl cyanoacrylate, and microcoils, depends on the experience of each operator.

In this case, IPM/CS was chosen as the embolic agent to reduce the risk of bowel infarction because superselective embolization with N-butyl cyanoacrylate or microcoils was considered difficult. To the best of our knowledge, only one study has reported IPM/CS as an embolic agent for gastrointestinal bleeding.<sup>10</sup> Imipenem/cilastatin particles in a mixture with iodine contrast are appropriately small (approximately 10–70  $\mu\text{m}$ ) and have a transient embolic effect; thus, they can be used when superselective embolization is impossible. Hemostasis was achieved, in fact, without any significant complications after TAE.

## DISCLOSURE

**A**PPROVAL OF THE research protocol with approval no. and committee name: N/A. Informed consent: Informed consent was obtained from the patient to publish this case report. Registry and the registration no.: N/A. Animal studies: N/A. Conflict of interest: None.

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